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SOIL CONSERVATION

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WELLINGTON BRINK EDITOR

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Front Cover: A little nostalgic, reminiscent of an era that is rapidly passing with the coming of header and combine. Photographer unidentified.

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SOIL CONSERVATION: No. 1 POSTWAR JOB

By THE HONORABLE CLAUDE R. WICKARD
Secretary of Agriculture

As Secretary of Agriculture, I have occasion to speak on a great variety of subjects, but there is no subject I can discuss with more enthusiasm than soil conservation.

The conservation of soil and water resources is one of the imperative jobs of America. There is no political, economic, social, or scientific disagreement about this fact. Fertile soil is a matter of national concern, and everyone interested in agriculture wants to see that soil protected and improved. It is part of the physical foundation of our country and no one wants to see it washed away.

Nevertheless, it has been washing away—in great quantities, from great areas, and at great speed. No other nation has lost so much soil in so little time. Ever since the first settlers landed on our shores, we have been plowing the soil and exposing it to the wind and rain. Each year, as more and more land was opened up, we lost more land, and at a faster rate, each year. When this continent was first being settled it was covered, as an average, with about nine inches of productive topsoil. Today the average depth of our topsoil across the country is only about six inches. That is the average. In too many places, the topsoil is gone all together. Only raw clay, or sand, or gravel is left. And in too many places, gullies have cut the land to shreds. It's mighty hard to get food out of gullies.

Let me tell you in other terms what erosion has done to us. It has ruined for any further cultivation some 50 million acres of cropland. That is an area equal to all the land in Maine and New York, and equal to, at least, one-eighth of our total present cropland. Before erosion wrecked it, this was some of the finest land in the country. Today it is producing no food for the war and tomorrow it will produce no food for the peace.

That is not all. Erosion has almost ruined another 50 million acres of cropland. Just about all the topsoil is gone from this land and it is riddled by gullies, but here and there a few people are still trying to farm some of this bankrupt land. I need hardly tell you they are attempting the impossible. Gullied land with little or no topsoil will not support an American standard of living.

Still another 100 million acres of cropland have lost more than half of their productive topsoil. And on yet another 100 million acres of cropland, the erosion process is under way. In short, erosion has already damaged more than two-fifths of all the cropland of the United States. The surveys show that additional hundreds of millions of acres of range and pasture land have also been hurt.

The Secretary of Agriculture, who brings an important message to America.

EDITOR'S NOTE.—By special permission SOIL CONSERVATION is privileged to publish the remarks made by the Secretary of Agriculture before the recent Rotary District Conference in Reading, Pa.

What I am thinking about is a major threat to the prosperity and to the very life of the country. Some people regard it as our No. 1 peacetime enemy, second only to our wartime enemies—the Axis nations. It is a cancer in our agriculture and a drain on our pocketbooks. Each year erosion costs the United States in the neighborhood of $3,844,000,000 in wasted soil, railroad and highway damage, flood damage, abandonment of farms, reduced reservoir capacity, and other losses. And where erosion is permitted, the standard of living soon goes down. Around the world, since the beginning of history, poverty has followed in the wake of erosion.

No, erosion is not new and it is not a devil confined to the United States. There is scarcely a nation on earth without its erosion problem, and some face a tougher job than we do. Here in this country nothing really effective to halt the inroads of erosion was done until 10 years ago, when the blowing soil from the Great Plains began blotting out the sun at midday over state after state. It was only then that any great number of people recognized the urgency and the emergency proportions of the soil erosion problem in our country.

To be sure, there had been terracing programs in the South, and from time to time, in different states, there had been stress on crop rotations, and cover crops, and fertilizers, and diversion ditches, and on a few other single practices. But no attempt had been made to put these several single measures together to do a complete job of erosion control, according to the needs and capabilities of the land itself. As a matter of fact, in most places it was mighty hard to find any interest in erosion at all. No interest in erosion, mind you, at a time when some two-fifths of the cropland of the country was being damaged and 50 million acres of our best cropland had already been washed away! Some agricultural leaders were even reluctant to admit that erosion took place in their states.

Then Congress established the Soil Conservation Service to carry on a nationwide action program against erosion, which was truly described as a national menace. By that action an effort was made to do something positive about a problem which had been seriously and tragically neglected until that time. Thus for the first time in history, a program was developed which protects the land against wind and water even while the land is being used for crop production.

Through the work of the Soil Conservation Service, nearly 10 percent of the farmland of the country has already been protected against erosion. By all reasonable reckoning, this is permanent and complete protection. I have heard of no farmer who ever seriously tried soil conservation and then gave it up.

Farmers approve of this program. It makes good sense, for conservation farming has demonstrated that it not only protects the soil but increases yields per acre at the same time. On thousands of farms in all parts of our country, conservation farming has resulted in an average 20 percent increase in production per acre. That's a worthwhile increase any time, but especially in war time. And this is accomplished with little or no additional equipment, time or labor. As a matter of fact, many farmers say that conservation farming is easier and that it takes less fuel and less time than the old-fashioned methods.

What is conservation farming? Dr. Hugh Bennett of the Soil Conservation Service has defined it as "common sense farming with scientific methods." It means treating every acre of land according to its individual needs, and using every acre according to its individual capabilities. Each acre of land, like each human being, is different from the next one. To get the best from it, it must be handled in just the right way. If there were some simple remedy for the problems of the land, that could be applied everywhere in a standardized treatment or formula, the job of soil conservation would be relatively easy. But there is as much variety in erosion as there is in the landscape.

There are some 59 major soil conservation practices now being used to stop erosion, conserve rainfall, and improve the land. These practices include terracing, contouring, strip cropping, grassed waterways, and so on. Each one is used to meet a given need or to provide a desired result.

The trained soil conservation technician prescribes for the land just as a physician prescribes for his patients. In a sense, soil conservationists are "land doctors." These men have learned that half-way measures will not do the job. Each conservation measure applied to the land is designed to support another one, and the conservation work on one farm is carried out with an eye to the next farm—and to all the farms farther downstream. This viewpoint is essential, for erosion has no respect for boundary lines. Gullies do not stop at fence lines or even for county lines, and neither do dust storms.

All this means that modern soil conservation demands the utmost in technical excellence to succeed. And all of us may well be proud that today the United States is leading the world in soil conservation. Farmers, scientists, and agricultural leaders of other nations come here to study what we have done, because it is the first time anything so effective has ever been done. Other countries are following our lead. They are adopting our methods—our technology and our approach to the erosion problem. More than one country has established a Soil Conservation Service, modeled after our own.

The services of our soil conservationists are being requested by the governments of our allies and whenever we can spare one of these men, we "lend" him, in a manner of speaking, for a short time. I regard this as right and as a tangible part of our Good Neighbor policy. Moreover, I believe it altogether proper that the achievements in soil conservation, which were pioneered and developed here, should be made available to all.

Now despite the amazing progress which we have made in the last 10 years, erosion of our irreplaceable soil resources is still a national menace. Erosion is still proceeding at a rate faster than our constructive work to stop it. Yet there still remain a few people who say that action is not necessary. Let us return, they say, to the educational processes. Actually what they are saying is that we should return to the do-nothing policy of the past which was responsible for the very predicament we are in today.

I have no quarrel with the educational processes. They must be utilized to the fullest possible extent. There is more need for education in soil erosion and soil conservation today than ever before. But we are not faced with alternatives. We are not forced to take either education or action. We need both —more of both. Education and action in soil conservation must proceed hand in hand. It is the only way we shall halt erosion in time.

I also hear some folks remark that when a piece of land belongs to a farmer he has a right to do with it whatever he wants. That attitude on the part of many sincere people reflects the love for action without restraint which has always characterized the American people—plus what, until recently, appeared to be our limitless natural resources.

In other words, so long as there was always new land to be had for the taking, it was no concern to a man's neighbors, or his children or the rest of society if this man farmed his land out in a few years. He moved on, or his children moved on, to new territory and started the process all over again.

Likewise, in those days, the problem of law enforcement was pretty much a matter of individual concern. Each looked out for himself and his own, while justice and social responsibility figured more or less incidentally, if at all, in life's simpler pattern.

But times have changed, as we all know, and I prefer to believe that we are all stewards of our natural resources. Ownership of land does not carry with it the right to destroy land; it does carry with it the responsibility to protect and improve land. Every farmer holds his soil in trust for generations yet to come.

The question is often asked why farmers need help to conserve their soil when soil conservation is such an obviously good thing that the average farmer ought to do it himself in his own best interests. The answer is that the average farmer is no more prepared to solve all his own erosion problems alone than he is prepared to solve all his own legal or medical problems alone. He needs specialized, scientific assistance, and the government is making that assistance available because the

nation also has an interest and a responsibility in the protection of soil resources.

For example, to handle excess water safely, on sloping land, it is usually necessary to build terraces or ditches. The terraces need to have protected outlets, or the water will begin to cut into the soil. And even after you have moved the water safely off the field, you need a place to put it. For the farmer to solve such problems of water disposal all alone, he would need to have some degree of proficiency in engineering. But most farmers do not have this specialized type of training. Most farmers are not engineers, or hydrologists, or agronomists or foresters. They are farmers, and when it comes to a matter of dealing with an erosion problem on their land, they usually require the help and advice of a trained soil conservationist if they are to arrive at the correct solution.

I want to tell you how this technical service is made available to farmers, and to do that I must tell you a little bit about soil conservation districts.

Soil conservation districts are subdivisions of the states. They can be formed only in those states which have passed laws authorizing farmers to form them. They can be formed only in the manner prescribed by these laws. Farmers wanting to organize a district must submit a petition to the state soil conservation committee. The committee then holds a public hearing on the question in the area proposed for district organization. If the public hearings show a favorable sentiment, the question is then put to a vote of the land owners and land operators in that area. In other words, the farmers themselves decide whether or not there is to be a district for soil conservation.

A few individuals from a bygone era, who are more concerned with personal power than with progress, raise a shrill cry once in a while that these districts are arms of federal government and "regiment" farmers. I find it hard to call this process "regimentation."

If the farmers vote favorably on the establishment of a soil conseravtion district, it becomes a legal subdivision of the state. However, it does not have the authority to tax or to issue bonds. In most states, the laws provide that district affairs shall be directed by a board of district supervisors, composed of five members. Three of these members are elected by popular vote within the district and two members are appointed by the state soil conservation committee. Where is the "federal regimentation" here?

The supervisors go to work with the farmers to develop a soil conservation program for the district. They decide for themselves what they want to do, when they want to do it, and how they want to do it. And because they are working together, in full cooperation with one another, they are able to carry on a constructive program that will get things done.

Now here is where the technical service of the Soil Conservation Service comes in. It happens very often that the supervisors and farmers of a district decide they want some technical assistance in carrying out their program. In that case they may ask the Department of Agriculture for it, and if a technician is available, he can be assigned to work in the district. In the same way, a district may request—and receive—assistance in forestry problems from forestry agencies, in educational problems from the Extension Service, in roadside problems from the highway department, and so on. Farmers working together on a common problem are able to get more help and get more done than when they work independently and alone. That has been true ever since the days of the Pilgrim Fathers and district organization is in the best tradition of America. In this country, men and women have always banded together, in a free and voluntary manner, to accomplish worthy objectives and the wishes of the majority. This is the very spirit of democracy.

Today, 45 states have soil conservation district laws. Under the provisions of these laws, farmers have organized—by their own votes—more than 1,000 soil conservation districts. More than 2,500,000 farms or ranches, covering more than $500,000,000 acres, are now within district boundaries. Farmers have made a magnificent start on this prodigious problem. This is the best kind of evidence, I think that farmers recognize the urgency of

controlling erosion. Farmers know, better than anyone else, that soil conservation work cannot be done on the land unless somebody goes out and does it. They know, too, that educational processes and meetings alone will not plug any gullies. They remember that educational processes and meetings alone never plugged any gullies in the past.

Soil conservation technicians are helping farmers solve their erosion problems out in the fields and pastures where the erosion occurs. That is where it counts; where actual results can be obtained.

New and better ways of controlling erosion which may be developed in Iowa are promptly made available to technicians working with soil conservation districts in Pennsylvania and in other states. When a better method is discovered in Pennsylvania, it is made available right away to the technicians in every other part of the country.

The same is true of discoveries and developments at the soil conservation experiment stations, which are conducted cooperatively by the state agricultural experiment stations and the Department of Agriculture. Department conservation nurseries test new and promising grasses and plants for erosion control. Heavy machinery and equipment, which may be essential for two weeks or two months in a soil conservation district, are made available by the Service and then moved on to the next district in some other part of the state or in the next state. Technicians are moved, too, from one district to another, as needs develop or dwindle.

In these and many other ways, we in the United States are carrying forward a highly efficient, nation-wide program of soil conservation. The same high technical standards of work prevail in all states throughout the country and the so-called overhead costs are kept to a minimum. Add to this work the conservation achievements of other National agencies, such as the Agricultural Adjustment Agency and the Forest Service, and the total conservation effort is all the more significant.

How different it would be if we had 48 independent soil conservation services, each with different technical standards, and each attempting to maintain its own corps of technicians, experiment stations, nurseries, stocks of heavy machinery and equipment, and its own administrative organization for this work. Think how the costs would go up and the technical standards would begin to waver. Perhaps for financial or political or other reasons some states might even abandon the program.

The United States is a great nation because it was richly endowed with natural resources and because Americans are people of great ingenuity. I believe we shall always have our ingenuity, but we *can* lose our natural resources. We can conserve these resources, if everyone will take an interest and do his part. In this job there is plenty of room for all to serve.

For many months, I have been urging that we in America emphasize those undertakings, which will at once contribute most toward the winning of the war and, at the same time, help us forward toward our great peacetime objectives. Soil conservation is such an undertaking. Today it is giving us greater production of food and fiber for war, and at the same time it is protecting and improving the land for all the years to come. Some day our victorious men will be coming home, and we shall turn to the business of building a better life and a better country than we have had before. When that day comes, you will find that conservation of our soil is still high on the list of the great unfinished jobs of America. Remember that it is a big job and a necessary job—as big and necessary as America itself.

War-time values of farm and ranch ponds for sh production is well shown by the fact that in he Coleman work-unit of the Central Colorado, exas, soil conservation district 200 ponds will e stocked with bass and bream this summer alone.

Lespedeza bicolor, favorite plant for field borders, is a favorite for bobwhite quail also. In 38 out of 40 plantings of bicolor on the State Game Refuge at Belmount, South Carolina, bobwhites this year moved in and wintered.

First, make a contour map, instructs Mr. Summers. Exaggeration of slope is necessary for a good demonstration. Trace each contour line on a separate piece of half-inch cornstalk board. Cut with a keyhole saw.

By WILLIAM H. LATHROP

George E. Summers, Van Buren county, Iowa, soil conservation district technician, no longer worries whether his farmer-listeners are "on the beam" when he talks about contouring.

In Summers' meetings, farmers now say "I see what you're talking about." And they do.

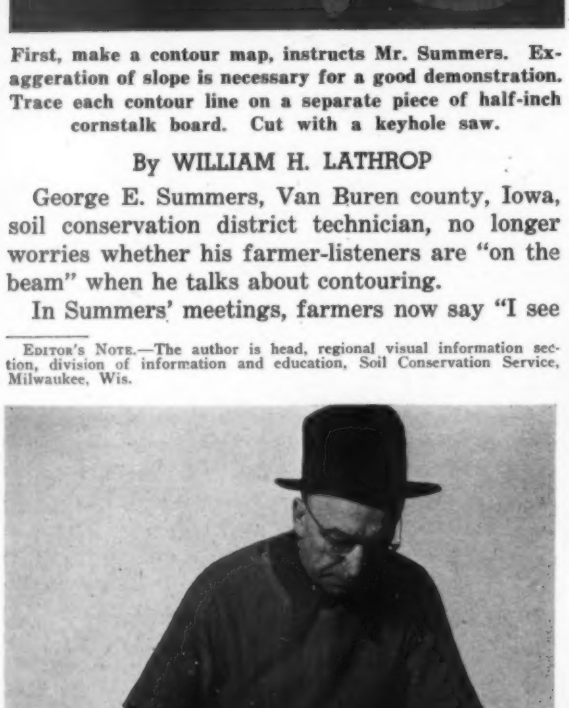
With 50 cents worth of cornstalk board and some lumber scraps, Summers built a take-apart model of a hillslope which has saved him 10,000 words per farmer in explaining countour lines, where they should be placed and how to handle point rows.

On the model slope, he lays out contour lines with pins, using a "T" pin to represent a level. By removing the slice of the model in which the pins have been placed he demonstrates quickly that the contour line is level.

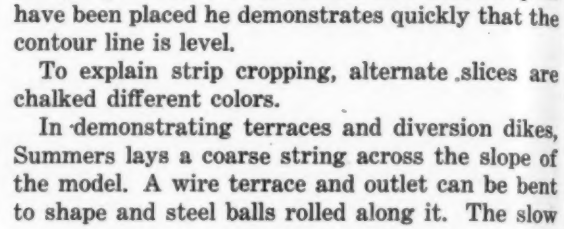
To explain strip cropping, alternate slices are chalked different colors.

In demonstrating terraces and diversion dikes, Summers lays a coarse string across the slope of the model. A wire terrace and outlet can be bent to shape and steel balls rolled along it. The slow

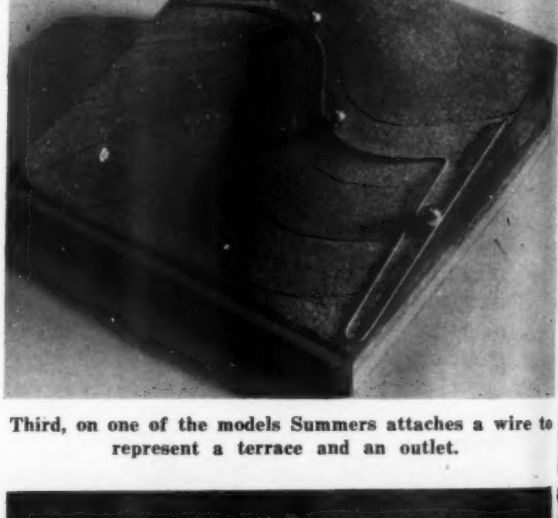
EDITOR'S NOTE.—The author is head, regional visual information section, division of information and education, Soil Conservation Service, Milwaukee, Wis.



Second, three-inch dowell pins are fitted in the wooden base to hold the slices together. Shape slices with rasp. Finish with sandpaper.



Third, on one of the models Summers attaches a wire to represent a terrace and an outlet.



Fourth, we see Summers demonstrating the device. Here he employs a model representing a typical slope in his territory to explain point rows to Clarence Strait and John Workman, Van Buren county farmers.

speed is contrasted with that of a ball allowed to roll straight down the slope.

Summers says he has found that the take-apart model is much simpler to build than the usual plaster of Paris model and in addition is more effective for demonstration purposes. His foot-square model, base and all, weighs less than 4 pounds.

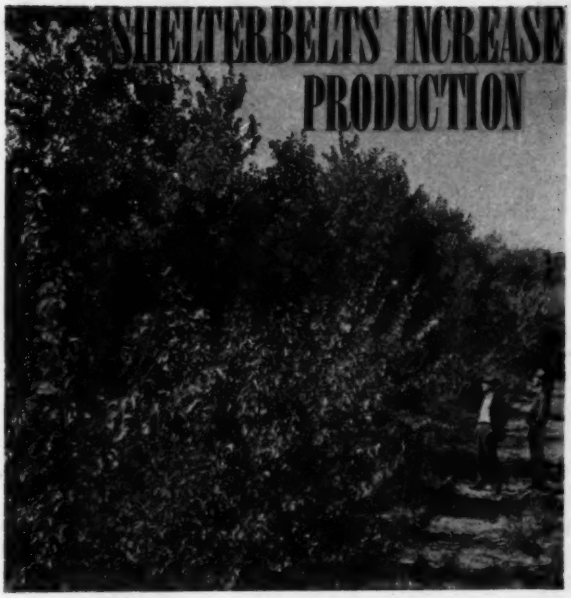
FARMERS FLOCK TO DISTRICT REFERENDUM

An intensive educational program, including all the ordinary methods and some not so ordinary, resulted in 74.3 percent of the eligible voters in Switzerland County, Ind., participating in the soil conservation district referendum March 24. Of the 1,879 eligible voters, 1,357 voted for and 52 against the district.

The problem was not only to acquaint people with the district but to get them to vote, because the Indiana law requires that 60 percent of the eligible voters cast ballots and 60 percent of those voting be in favor of the district.

Roy E. Babb, Madison, district conservationist, outlines the methods used by the local sponsoring committee as follows:

1. The county agent and home demonstration agent discussed districts in every group meeting in the county.
2. Sponsoring committee and "action committees" were carefully selected, their principal functions being to stir up interest, explain the district, carry petitions, and stimulate voting.
3. Vevay Kiwanis Club adopted the district as one of its major projects. Merchants made it a point to remind rural customers to vote.
4. Free advertising in theatres, news stories, and party line telephone calls donated by the telephone company helped to keep the subject before the public. Two local banks paid for neswpaper advertisements urging farmers to vote.
5. Local farm organization leaders gave active support.
6. Cards explaining the district and the referendum were sent to every landowner.
7. Receipt of absentee ballots was checked every three days, and each committeeman was notified so he could know the situation in his township.
8. The organizing committee met 12 days prior to the referendum and checked on the number of absentee votes and on the interest that had been shown. It then assigned more committeemen to sections where interest was lagging.



R. J. Tucker gives a large measure of credit to shelterbelt plantings for the production of more than one-half bale of cotton an acre last year on his deep sandy land farm northeast of Paducah, Tex.

"I would rather have 100 acres behind shelterbelts than 150 acres outside them. Before the shelterbelts were planted, I had lots of trouble getting uniform stands of cotton and other crops because early spring winds blew out the young plants. Of course, the kind of yield you get depends a whole lot on taking care of your land, but the shelterbelt helps."

Until the shelterbelt was planted, Tucker said all trees except plums had been winter-killed when he attempted to grow an orchard. He now has 427 plum trees, 50 pear trees, and 50 apple trees safely growing under the protection of shelterbelts on the north and west sides of his orchard.

The accompanying picture convincingly tells how a good farm shelterbelt appeared last October after a dry summer. It was made on the W. W. Heckathorn farm near Childress, Texas, in the Hall-Childress soil conservation district.

Similiar methods in Clark County, Indiana, resulted in ballots on March 10 from 75 percent, or 2,035, of the 2,711 eligible voters. Votes in favor totalled 1,937. The method of approach and certain details varied because of the presence in Clark County of a larger city and several defense plants, as contrasted to Switzerland County's purely agricultural area.

Conservation in Cleveland

This, too, is "school!" A great city, no less than a farm, has its serious erosion problems. One of them here gets the attention of schoolgirls Ruth Roorecht and Lois Ritter.

The erosion hazard strikes at cities, too. Teachers, civic leaders and the press are beginning to worry about the menace of debris-burdened streets to the major crop of every crowded town. Raw slopes, they know, endanger boys and girls no less than corn and potatoes.

Little more than a year ago thirty blocks in Cleveland, Ohio, constituted a disreputable catch-all for rubbish, sludge, garbage, tin cans, and roving rocks. Today, the Walworth Run-Train Avenue artery is on the mend. Cooperative enterprise and an awakened community conscience are effecting slow but certain transformation. Rats, ants and cockroaches are moving out. Grass, trees and shrubs are moving in.

Children themselves took the initiative. They were just a little bit ahead of everyone else in discerning the street's sins in terms of washing slopes. Children digging in the dirty sand along the way brought the comment of another child, "That's the way these big ditches start!"—and thereby planted a thought that grew, and grew, and grew.

For several years Margaret Suhr Reed had been drumming for conservation in the Cleveland Plain Dealer. On Arbor Day, and again on Armistice Day, tree-planting on a large scale had been encouraged. Here, along these thirty blocks paralleling a railroad track, was another challenge to city conservationists. Mrs. Reed suggested the merits of the Walworth Run-Train Avenue project in her column.

Grade-school children spread the word, churned up neighborhood interest. A large community

meeting, called to consider the situation, brought together the mayor and several councilmen, members of the city health, landscape and planning departments; representatives of the railroad and bordering manufacturing plants, spokesmen from the West Side Garden Center, forward looking private citizens. The celebrated Peter Witt spoke feelingly of the departed beauties of the area, recalled the pristine period, not so many years ago, when springs ran clear and deer roamed the woods. The meeting decided on direct, immediate, cooperative action.

A thousand pupils of Walton, Mill and Clark schools pooled their efforts. A committee called on manufacturing plants and other business houses to stop dumping slag down the slope toward the highway. Children went from house to house, asking families to find other, and better, means of garbage disposal. Maps and diagrams, reflective of the spirit and theme of soil conservation everywhere, began to paper the walls of classrooms. One of them was titled, "Ditches become gullies that speed erosion." Another bore the caption, "Footpaths on Train Avenue start erosion." A third posed the question, "What will you choose?" and offered a choice between ugliness and beauty, disease and health, waste and conservation, filth and cleanliness, erosion and plants, a civic eyesore and a beauty spot. One young artist graphically portrayed a foundry's slag sliding down a slope. Another pictured some of the street's vermin.

Three young Clevelanders getting acquainted with the soil: Helen Hartman, Robert Speir, and Rose Marie Balince.

In the fall of 1943, using suggestions supplied by the landscape department, the school children set out some 300 trees. In the spring of '44 Lincoln High joined the movement in time to help plant large numbers of shrubs and matrimony vines and other ground-covering vegetation. In little more than one year the street has begun to gain an aspect of respectability.

The task is well begun, but the school kids and their elders are determined to see it through. This summer they are spending many vacation hours policing the street, quick to pounce upon violations of the conservation code they have invoked. They know where to turn for help and encouragement: James Lister, of the landscape department, Henry W. Speeth, of the city council; Mayor Frank J. Lausche, Mrs. Reed, the Cuyahoga County Conservation Council, Nola Rearick, art teacher at Lincoln High School, others of a rapidly growing group of conservation-minded citizens. Bank protection of streets has joined the Victory garden in the great metropolis of northern Ohio, to impress upon lawyer and mechanic, office worker and industrial employee, parent and child, the importance of soil conservation.—WELLINGTON BRINK.

RAMSER AWARDED JOHN DEERE MEDAL

C. E. Ramser is announced as the 1944 recipient of the John Deere Medal awarded by the American Society of Agricultural Engineers. The award "confesses the debt of agriculture, and of industry which serves it, to both pure and applied research by men in public service. It honors a man who probably has found out and made known for service to mankind the world's greatest fund of facts about the habits of flowing water as it affects the soil and the permanency of the world's food resources."

In charge of hydrologic investigations of the Soil Conservation Service, Mr. Ramser directs experimental work in the hydraulic laboratories of Spartanburg, S. C.; Minneapolis, Minn.; and Stillwater, Okla., and is responsible for hydrologic studies being made at some 40 points in the United States.

Today we can report that considerable strides have been made toward the accomplishment of a practical program of wildlife management as a result of soil and moisture conservation measures applied by farm and ranch operators.

SOIL CONSERVATION—ITS RELATIONSHIP TO WILDLIFE AND HUMAN WELFARE

The attractive young lady at the right is this year's winner of the Asa B. Wallace Memorial Essay Contest. And the bit of prose which carried Gladys Kunze to fame and glory in her beloved State of Missouri is to be found just below the garden soil which so engrosses the attention of the sunbonneted pupil of Whitehall School, Fayette. Until better prose comes along, it will do very nicely as a model for much older soil conservationists.

Cash prizes are awarded to district and State winners in the annual essay contests sponsored by the Missouri Conservation Commission, contestants being boys and girls participating in the Missouri Nature Knights Program.

Gladys Kunze, State winner.

By GLADYS KUNZE

The greatest natural resource of our nation is its soil. It is the direct source of all plant food and the indirect source of all animal life. The wheat that makes our loaves of bread, the corn that feeds our cattle, hogs, and sheep, the cotton that clothes our school children, the trees that provide our shelter—all these and more come directly from the soil. The farmers of America are all set to make "food fight for freedom". It's up to them to grow more food for our fighting men, our working men and our allies. The welfare of the human race depends on these people doing their job. The soil is truly the arsenal of freedom.

Allied with man in producing both food and clothing is the wildlife of our country. The birds that follow the farmer's plow, picking grubs and insect larvae from the newly turned furrows, are battling with him against the enemies which damage his crops. The songbirds and game birds wage a constant war against other insect enemies. Even the small furbearing mamals have gone to war by providing furs for our flyer's suits. The most important influence upon this wildlife is the land on which it lives. Two of the necessities of existence, food and cover, are furnished by the soil.

The soil of the United States is in danger due to unwise farm practices. When trees are cut down, slopes plowed up and down, and vegetation burned the soil is left without protection. Water flowing over the surface removes thin sheets of topsoil. On slopes gullies may be made. On prairie lands wind erosion occurs. With a depleted soil both man and wildlife must suffer.

There is a complete interdependence of all fields of conservation. The conservation of the soil is directly related to the conservation of wildlife. Every farming practice, in its own way, makes a farm a better or worse home for wildlife. It determines the number of songbirds, gamebirds, and fur animals that may share his land. There are fewer wild animals in Missouri in our generation because there is less land suitable for them. There is land which cannot or should not be used for farm crops such as steep slopes, gullies and draws, fence rows and corners. The planting of trees, shrubs, and grasses on such land would not only protect the soil against erosion but would provide food and cover for wildlife.

One of the crops which may be planted to build the soil, smother weeds, check erosion, and furnish forage is sweetclover. It furnishes some food to a number of birds, and makes good cover for game birds such as pheasants and quail. In this case the farmer, the soil, and the birds have all been directly benefited. Sweetclover may be planted in eroding gullies, washes, wind-drifting soils, next to corn that is to be left standing, or next to any good natural cover.

Another soil-bulding practice is that of plowing under nitrogen-fixing crops, such as clover, peas, soybeans, alfalfa, sweetclover or any other leguminous crop suited to the locality in which it is to be grown. This practice, known as green manuring, may be used by birds rearing their young, as it provides a nesting site and food, if the crop is not plowed under until after the nesting season. Strips may be left unplowed until spring for ad-

ditional value to wildlife as they are places of refuge in winter.

Strip cropping is used to check the flow of water on slopes, to allowing the slow-moving water to drop its load of topsoil, and to give the water more time to soak into the ground. These strips may furnish nesting, shelter, emergency cover, and food for wildlife.

Gullies can usually be controlled by building check dams and planting the banks with trees and sowing grasses. Black locusts are popular as trees for gully control, in addition they furnish nesting sites for birds. Small shrubs such as buckberry may be planted in the gully. Again we have a sound soil conservation practice coupled with wildlife conservation.

On slopes and along the banks of streams the trees protect the soil from soil erosion and provide food and shelter for many of the furbearing mammals as well as birds. Nut trees are especially valuable as sources of food. Trees planted for windbreaks can accomplish the same purpose. Whenever possible hollow den trees should be left standing.

In the arid and semi-arid regions of our country, nature provided special kinds of grasses to protect the soil from wind erosion. Man plowed up or overgrazed these grasses and now we have our "dust bowl" with its resulting wind erosion. Needless to say the wildlife also vanished. These grasses must be planted again before people can earn a living there or any wildlife can be established.

The burning of pasture lands destroys the humus that should be returned to the soil, injures the grasses, and destroys food and cover for small animals.

The great principle of wildlife conservation is that there will never be more wildlife on a farm than the food and cover will support. The basis for this provision of food and cover is in the conservation of the soil.

We may well ask ourselves, "Are we protecting the soil our soldiers are fighting for?" For in the natural fertility of the soil, in its ability to grow crops, the welfare of every living thing, human or animal, must depend. The birds singing in the trees, the game birds and small furry mammals are a part of the American way of life. I want to see them here tomorrow as well as today. That is why I believe in soil conservation.

GRAND JURY TOLD ABOUT SOIL CONSERVATION

Soil conservation has been getting the active support of adherents from many quarters, but something of a record was set recently in Columbus, Ga., when Judge T. Hicks Fort based his entire charge to the Taylor County Grand Jury on the subject of soil conservation.

Pointing out that the circuit over which he presides is composed of only one "city county" and five rural or farming counties, Judge Fort said that he had been "giving intensive study and thought to the matter of farms and farming" since the county grand jury last met.

"It may seem out of place for one in my position to assume to advise practical farmers," he said in prefacing his remarks, "but oftentimes farmers, like other business people, are so close to their own difficulties that they may not see them clearly and a word from an outsider might provoke thought, and it is in thought and meditation that the best methods are often devised."

Calling attention to a recent article in the Reader's Digest, entitled "Friends of the Land," Judge Fort said the article forcefully expressed the idea that "our civilization is actually founded on about 8-inches of topsoil and when that goes our civilization will go with it.

"We can well illustrate the effect of soil destruction upon the economy of any community by observing what will take place on just one ruined farm," he said.

"At this time," he continued, "several million people are living on worn-out farms and seem helpless even to get away from them. They are economic liabilities and the rest of the nation is partially chargeable with their relief. Millions of children are without proper diet, schooling, or home conditions, all because of improper and improvident handling of a farm situation.

"What is the cause of all this?" Judge Fort asked, "The dark and red silt which colors the creeks and streams after every washing rain tells the story, and it is not dealing in imagination alone to say that as that silt-laden water moves down the streams of this county—streams like Cedar Creek, White Water, Patsalaga and others —along with it go banks, stores, residences, school houses, churches, and even families, which are the direct products of this land if preserved and properly farmed.

"There is a correction and a cure for this waste

(*Continued on page* 33)

MAKING RANGE ADJUSTMENTS IN UTAH

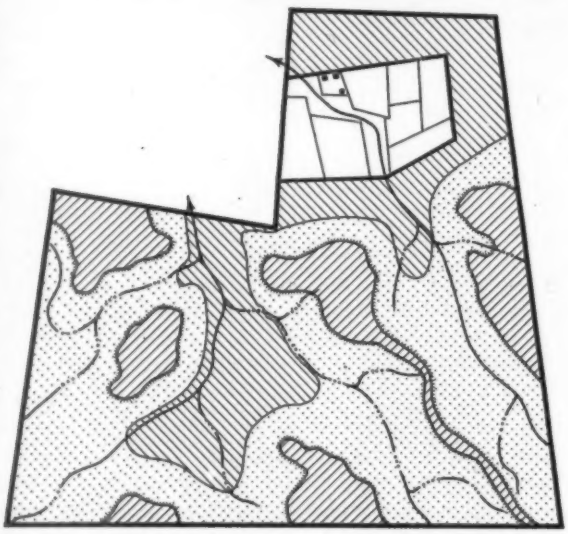


Fig. 1.—Four classes of forage producing lands on a typical Utah ranch unit. (See also cross section illustrated in Fig. 2.)

Areas capable of carrying two or three times their present capacity of livestock if intensively treated by clearing and reseeding.

Range lands which can be improved by usual methods of range management.

Areas which should be retired from grazing as part of watershed protection or some other more appropriate form of land use. These are generally the steep mountainsides adjacent to the valley bottoms.

Farmstead or ranch headquarters where wet or irrigated pastures, dry hay and other feeds can be produced to supply livestock removed from lands little suited to grazing.

By C. P. STARR and D. S. WINN

Most of the land in Utah is used for grazing, and as such, constitutes a major resource. Many acres provide excellent forage, and with little more than good range management will continue to produce at present capacity. There are, however, large acreages which are of questionable value so long as they remain in their present condition. They may have excessive slopes, unstable soil, or an undesirable or too sparse vegetative cover. Use may be unduly expensive because of the difficulty of applying good management. Climatic conditions may interfere with proper use and cause exorbitant livestock losses. Adapting lands to their best use and applying good range management require the most careful consideration.

EDITOR'S NOTE.—The authors, both of the Soil Conservation Service, are, respectively, assistant state conservationist, Salt Lake City, Utah, and zone technician, Albuquerque, N. M.

The following summary represents an approach to objectives in range land use adjustment and provides some general recommendations for reaching the goal.

1. *Continued application of carefully selected range management practices:*

There are many acres of the so-called "poorer" range land that readily respond to such practices as rotation grazing, proper livestock distribution, proper seasonal use, water development, and similar acceptable practices. As an example, near Grantsville, Utah, a well defined "dust bowl" was converted to an excellent winter grazing area largely by the application of a few of the most obviously needed range conservation practices. There are many other areas throughout the state where the wisdom of this type of treatment has been substantiated.

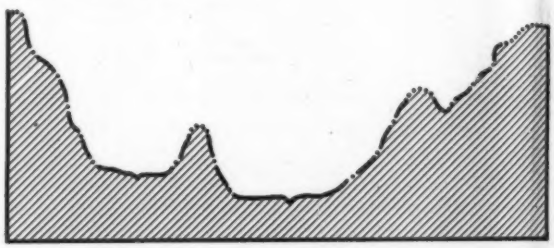


Fig. 2.—Typical cross section of Utah mountains and valleys.

Land which can be improved by usual methods of range management.

Areas capable of carrying 2 or 3 times present livestock numbers if given intensive treatment of clearing and reseeding.

Areas which should be retired from grazing and left to function as protected watersheds.

2. *Intensive treatment of areas adapted to desirable forage, with a view to increased grazing capacities:*

Intensive treatment of ranges as referred to here means clearing the range of less desirable species and replanting to perennial forage cover those areas which are adaptable because of gentle topography, suitable soil, and moisture adequate to maintain forage stands. Where lands are suited to this type of treatment, grazing capacities can be increased many times. This practice has been found to be extremely profitable and helpful in the range conservation programs of many soil conservation districts, among them the San Juan, Upper Sevier, Escalante River, Vernon, Grantsville, Sanpete County and Iron County districts.

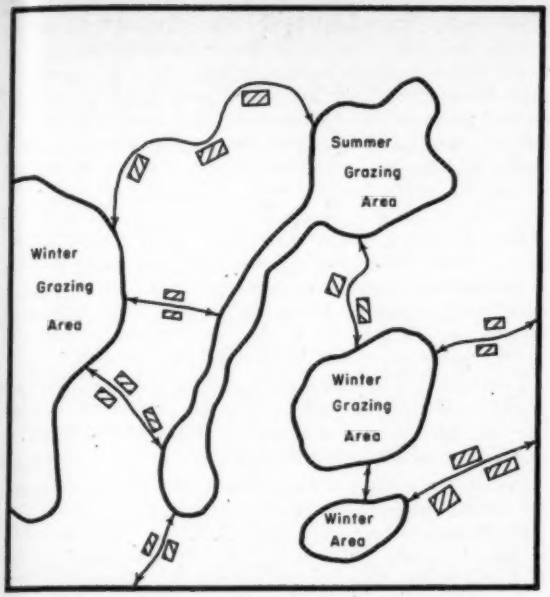


Fig. 3.—Pastures to supplement trail-grazing.

←→ Typical routes of livestock movement between summer and winter grazing areas.

▨ Desirable location of dry, wet, or irrigated pastures along livestock trail routes.

3. *Retirement of lands unsuited to grazing, and possible translocation of livestock now using these lands:*

Lands more suited to producing forest products or those which, in their best condition, cannot be grazed without destroying their value as protection to a watershed and protection against run-off damage to more fertile farm lands at lower elevations, should be retired from grazing. This involves taking care of the livestock which depend on these lands for forage at the present time. In some instances, retirement can be accomplished by the improvement of local range lands or by the development of wet, irrigated or dryland pastures nearby. In other cases the movement of the stock to a new locality will be necessary.

Translocation of livestock from old established ranges to other areas where better grazing facilities can be provided is a rather drastic action. It entails considerable adjustment on the part of livestock operators, but may be necessary if grazing in areas of this kind is to be placed on a sound basis. Taken from a long-time point of view, it does make possible a successful adjustment of present livestock numbers to the over-all range capability to produce forage and would probably not result in an actual reduction of the total number of grazing livestock.

In addition to the adjustments on range areas, by far the most promising means of providing the needed forage for these livestock is the growing of supplementary forage on wet, irrigated, or dry pastures or on cultivated farm lands. Pastures on irrigated farms would be the solution in many places. In others, it might be possible and desirable to develop dry pastures on dry farm areas or on abandoned dry farm lands. The practicality of developing such range areas as are susceptible to intensive treatment by clearing brush cover and planting perennial grasses has already been proved. Such areas have relatively high grazing capacity and a large number of livestock can often be accommodated on small areas.

To illustrate, one Utah rancher has released his winter permit on public domain and now keeps his livestock on crop aftermath, forage harvested from irrigated pasture, and grain. He claims that his losses during the fall and winter and during the lambing period have decreased. He is able to market a better and heavier lamb crop and do it earlier, and his total marketable wool crop has increased noticeably.

4. *Provision for livestock forage along established trails:*

Livestock movement between summer and winter ranges is and has always been dependent upon rather extensive trail grazing en route. Excessive grazing, drouth, and increasing settlement along established trails have whittled down the forage. Heavy expense to operators for feed purchased en route, excessive loss of livestock along the way, and severe abuse to the land have resulted.

Trailing livestock from summer to winter range and back again may always go on to some extent. There are many operators who, after leaving the winter range and having no other place to go, depend upon the week or two involved in trailing to provide forage for their stock until the vegetation on the higher ranges develops sufficiently to permit grazing. Dry, wet, or irrigated pastures should be provided along the trails to furnish this needed forage and to replace the natural forage which has all but vanished from the scene. Such forage should at least protect livestock against hazardous losses of weight. If properly developed, they would also provide suitable lambing areas.

The Grantsville Soil Conservation District in western Utah is already giving thought to the matter of providing dry, perennial grass pastures within the district boundaries. It is believed that

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WE MUST DO SOMETHING, SAYS BANKER

Boyd Rist is a young banker at Wymore, Nebr. Before he entered banking he was a county agent. Instinctively, he appears to think in terms of investment, dividends, the safety of the original capital. He believes too in the dignity of the individual and in the importance of private enterprise. Soil conservation is to him a synonym for sound agriculture. And the soil conservation district is a cooperative, common-sense way to insure the future of both the individual farmer and the agricultural community. Mr. Rist made the following statement at a recent hearing in Beatrice on a proposed addition to the Gage County, Nebr., Soil Conservation District.—THE EDITOR.

I have discussed the soil conservation program with at least 150 persons in the south half of Gage County, including some of those in the southwestern part who are already in the soil conservation district, and all of them express it this way: They are a little doubtful about some of the conservation practices, about which they have heard but which they have not tried or have not even seen; nevertheless, all are for this program without exception. Something has to be done. There is a question, of course, as to what should be done. That is the reason for this meeting tonight.

I feel that we have made a beginning toward that something. I think it is a matter of holding back the water and keeping the soil. The soil is the basic resource, and the next thing we must have if we are to raise anything is water.

We have done so little about our soil and water resources, yet have made tremendous strides in the development of farm machinery, seeds and the rotation of crops. We know a lot about machinery, seeds, and rotations, and have done wonders.

Actually, farm machinery and seeds have maintained the production of this country far more than probably should have been expected in view of what we have lost. We have lost, during the last 3 years, three times as much fertility per year through the washing away of soil as we have taken out of the land with all of our crops. That is serious. Perhaps the reason we have not done much about conserving soil and water rests, to a degree, on our having square fields. A few surveyors gave us straight-line farming.

When the land was young, there was grass and it would hold back the water so that much of it could soak into the ground; the soil was fertile, and we felt that we did not need to watch it too closely. But now, in the last 10 or 15 years, some of our farms have been abandoned.

Here is another side. We thought, as did many others this year, that with so many young men called to the armed services there would not be enough farmers to farm the land. Lo and behold, we have listed 25 potential renters who have requested us to find them farms to rent. On the face of this, we first gained the impression that there was a surplus of renters. Analysis, however, shows that these farmers are renting now, but want to find better farms. We have farms in this county which were not farmed this year—poor farms. Their soil was thin and now much of it has been washed away.

That is what happens. The poorer land is abandoned first. We have got to do something about it. We must save this basic thing that makes crops possible. This program, fundamentally, is for that one purpose.

We should stop erosion in the valleys, too. I think it is a comprehensive program in any watershed. You can go to the highest point in an area, where a part of the watershed drains, and hold the water back by using recommended measures. Add a system of farm reservoirs to that, and you will be able to hold the surplus water—hold it where it falls, rather than spending millions of dollars getting rid of it after it is down in the valley.

It will take a very comprehensive program to get such results. I think it can be done, and a lot of benefit will be derived from it—preventing the soil from being washed away, getting more water into the ground, and perhaps even having water for irrigation. I hope that in the next several years a program of that kind can be worked out. It will mean increasing production 25 percent.

I read an item in a New York paper which indicated that yields could be increased at least 50 percent by holding our soil and getting moisture into the ground where it would be available when it is needed.

We have a rather peculiar situation in eastern Nebraska. We have good soil—very good soil—and plenty of rainful. Unfortunately, the rains come in bunches. There is hardly a year or season that does not have at least one dry spell of 2 or 3 weeks. We must try to assist Nature in spreading out the availability of water. This simply means holding the water where it falls, so that it will be available during those dry spells, when rains do not fall.

I was rather surprised recently to learn that some of our forefathers knew of this thing—that it is not entirely new. It is an old practice. I wrote down a few sayings. George Washington said that in 1797: "A half, third, or even a fourth of what land we mangle, well wrought and dressed, would produce more than the whole under our present system of management; such is the force of habit that we cannot depart from it." Here is another by Thomas Jefferson: "We now plow horizontally soils following the curvature of the hills and hollows on dead level, however crooked the lines may be. Every forrow thus acts as a reservoir to receive and retain the water; scarcely an ounce of soil is now carried off." Patrick Henry said: "He is the greatest patriot who stops the most gullies." Even those fellows knew and practiced conservation. They were all successful men.

I feel there is one important thing we have to consider—the individual. These men here have individual farms. Their primary interest is in things which will apply to their land. They want to raise a crop. The number of owners interested in this soil conservation program is surprisingly large, but it is even more surprising to learn that tenants are interested, too. In one place I talked with a tenant who lives on one of our farms. He said he is certain that he raises at least one-third more on that place than if the contouring and terraces had not been there. I said: "Wasn't it more work?" He replied: "Why, of course I had to figure out how to get around the point rows." He said also: "It is just a shame that this sort of work wasn't started 50 to 60 years ago, so that some of us who are farming would have something to farm with."

You men know, of course, that almost any farm practice, no matter what it is, is subject to defeat. You can get a friendly argument over any farm practice, whether it is deep furrows or what. Most any farm practice is subject to defeat, but the fundamental thing is that we must do something, and I think we want to.

CHIEF GOES TO SOUTH AFRICA

At the invitation of the government of the Union of South Africa, H. H. Bennett, Chief of the Soil Conservation Service, left July 1 for a two months trip to South Africa under the auspices of the Office of War Information.

Dr. Bennett is regarded as a world authority on soil conservation and land use, which are problems of major importance and interest in the Union of South Africa. He will exchange information with officials of the South African Government regarding social and technical aspects of the work now being done in both countries to control soil erosion and advance sound land use practices.

The War Food Administrator made Dr. Bennett's services temporarily available for the South African trip at the request of the Office of War Information.

One of the most recent honors to come to Dr. Bennett was the award, at a dinner in New York City on May 16, of the Frances K. Hutchinson Medal "for service in conservation." The Garden Club of America conferred this recognition with appropriate ceremonies at a large gathering in a leading hotel. The two sides of the handsome disk are shown here.

Knowing full well the tragedy of wasting soils, it is nevertheless a cheerful Chief who faces the sun of what can be a happier era.

GRAND JURY TOLD

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and this wanton destruction," he declared, "if it is only intelligently applied by those who are now living on the land and undertaking to make their living out of it. That cure is in applying proper methods of fire protection, terracing, draining, plowing, and treatment of the precious topsoil, which is the very basis of life and civilization."

Judge Fort also called attention to the stubble-mulch farming of Mack Gowder. "What has been done by this Georgia farmer on land no better than the average Taylor County land, can, and should be done by every farmer in this county," he said.

Elmer Deo (left), assistant county agent; Don B. Jewell, county agent; and Lee N. Rosencrans, district conservationist, consider the educational work to be done prior to the organization of the Leelanau County Soil Conservation District.

MANY GROUPS MERGE EFFORTS IN LEELANAU

By L. R. COMBS

Leelanau is an Indian word meaning "Land of Delight." And true the name, Leelanau County, Mich., is a delightful place—especially in spring and summer when cherry blossoms and brightly clad resorters enliven the scene.

Its agricultural history started with lumbering in 1850. Following that came grain and livestock farming, commercial fishing, fruit growing, and resorts where people from farther south fished, swam, boated, hiked, loafed, and cooled off in the breezes from Lake Michigan, which bounds the "little finger of Michigan" on three sides.

But like other areas where the land was not handled properly, wind and snow and rain also made a playground of Leelanau's originally thin but productive layer of topsoil.

They left gashes, bruises, and skinned places on the landscape and even piled silt on top of the snow during winters of light snowfall. Consequently, some people acquired a reasonable doubt as to how long the county might continue to deserve its name. Chief among these were the farmers and other year-around residents.

As Elmer Deo, county agent, said, these people realize that they don't have the best land in the world. But it is good land, and they have made a good living; they like to live here, and they want to keep what they have.

Maybe that is the reason why the people so wholeheartedly forward organization of a soil conservation district.

Leelanau's methods of organization were comparable to those which have proved so successful in the establishment of many other districts. Thorough education was a factor, of course. But this county brought also into play numerous other devices to get its district going. Leelanau certainly is an example of how districts can—and will, if given the chance—develop in response to popular demand.

When Don Jewell came to Leelanau in 1934 as

EDITOR'S NOTE.—The author is chief, division of information and education, Soil Conservation Service, Milwaukee, Wis.

half-time county agent (he also handled Benzie County) he took pictures of erosion all over the county and talked soil conservation. He conducted meetings and tours, continually "planting the seed of soil conservation." The seed bore fruit, meetings and tours, and in 1938 he and Paul Barrett, extension soil conservationist, conducted the first organized series of meetings on this subject. He interested the county land use-planning committee in the problem and visited the Benton Harbor demonstration project to see just what could be done by the modern methods of soil conservation planning. Lars Halvorsen, of Cedar, and Frank Ryant, of Maple City, started soil conservation plans on their farms, with the help of Jewell and Soil Conservation Service men from Traverse City. These extension demonstration farms showed farmers the possibility of farm planning for erosion control.

Deo came to the county in 1942 as Jewell's assistant and saw two major needs—erosion control and more dairying, with its accompanying increase in hay and pasture. Last year he took over when Jewell became full-time agent in Benzie County.

In the meetings in the winter of '41 and '42, Deo, Jewell, and others began to talk soil conservation and what districts were doing elsewhere. They took 33 AAA committeemen to the old project and

Frank V. R. Viers, Jr., soil conservationist (left), and Elmer Deo, county agent, discuss farm plan worked out with Edwin Bremmer, East Leland, a district cooperator.

F. Herrick Waterman, who farms east of Leland and is chairman of the district directors, grows alfalfa-brome mixture as part of rotation to conserve soil and provide hay for Guernseys.

the year-old district in adjoining Grand Traverse County to see what a complete soil conservation program could really do for a farm. Groups of Grange and Farm Bureau members also visited the Grand Traverse area. This resulted in developing three or more men in each township who could discuss districts intelligently.

Deo and Lee N. Rosencrans, district conservationist, explained districts to the agricultural committee of the county board of supervisors, of which Harry Lautner, Elmwood Township, was chairman. The committee visited Grand Traverse, talked to the new district cooperators and old project cooperators, after which they presented the idea to the county board of supervisors. The board endorsed the district idea, not because of any required precedure but because it heartily approved. It urged Deo and Jewell to continue with organization of a district. The supervisors also helped arrange meetings, line up men to circulate petitions, and when the referendum was held, 9 of the 11 polling of-

Father Edward Neubecker, Lake Leelanau churchman and ardent sportsman, helped organize the soil conservation district

ficials were county supervisors who owned farm land.

Catholic rural priests helped with the district organization by preaching on soil conservation and by holding meetings in church basements and community halls. Father John Klanowski, of Holy Rosary Church, Isadore, had been talking "plowing across the hill" and other soil conservation practices long before districts were heard of. Father Edward Neubecker, of Lake Leelanau, an ardent hunter and fisherman as well as an exponent of stewardship of the soil, and Father Charles Baker, of Suttons Bay, were other leaders who helped make the campaign a success.

Forty people attended a meeting at Father Baker's church one evening. Three-fourths of them had to walk through a snowstorm so blinding that Deo and Leonard J. Braamse, extension soil conservationist, doubted whether they would attempt to travel the 8 miles from Leland to Gills Pier.

Men and women to carry petitions asking for organization of a district were selected by noting the ones who displayed "salesmanship" ability at the various educational meetings. These included representatives of the Grange and Farm Bureau, AAA committeemen, local extension leaders, and county supervisors.

The county Farm Security Administration supervisor and the secretary-treasurer of the Farm Loan Association sent out notices of soil conservation meetings and emphasized the importance of soil conservation and the value of a district to their clients, many of whom circulated petitions, signed petitions, and attended the hearing.

The three Leelanau County newspapers and the Traverse City paper reported developments in detail, as did radio station WTCM, which gave broadcast time and spot announcements. After the district was organized, the station requested help in stabilizing the sandy land around its transmitter in southern Leelanau County.

Herrick Waterman, of East Leland, president of the county Farm Bureau, and Charles Noonan, of Empire, master of the Pomona Grange, encouraged members of their organizations to support the district and urged its formation.

Other informational devices included circular letters by the county agent, special exhibits and window displays with which the Traverse City Soil Conservation Service office helped, the use of movies, slides, and charts.

Given 1 month to turn in the lists, the petition carriers rounded up 800 signers among the 1,119 farmers—the largest number of signers in Michigan up to that time and probably one of the largest percentages in the United States.

The original petitioners asked for the exclusion of towns and villages, but some of the county supervisors and local leaders insisted that all land in the county be included. Several of the villages encompassed agricultural land. Empire actually boasted an entire farm.

Five islands just offshore—North and South Fox, North and South Manitou, and Bellow—afford hunting, produce timber, and do a certain amount of farming. So Leelanau County became perhaps the only soil conservation district to include islands within its boundaries.

The State committee held the hearing in December 1942. Nearly 200 people packed the small courtroom in Leland during a snowstorm when side roads were blocked. No "anti" talks were forthcoming, and an appeal for a show of hands failed to bring a single "no" vote.

Because of the 100-percent support of the district, the State committee set some kind of a record for speed in the snowbound town of Leland that December day. Meeting in the evening, it approved the organization of the district and set a date for the referendum. Simultaneously, the local people decided on polling places and recommended polling officials whom the State committee approved before leaving.

At this point, one slight, but not serious, error appeared. Having been informed of the high number of petition signers and the outcome of the hearing, the people figured their job was done and

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MORE IDAHO SPUDS WITH GREEN MANURE CROPS

By FLOYD W. DORIUS

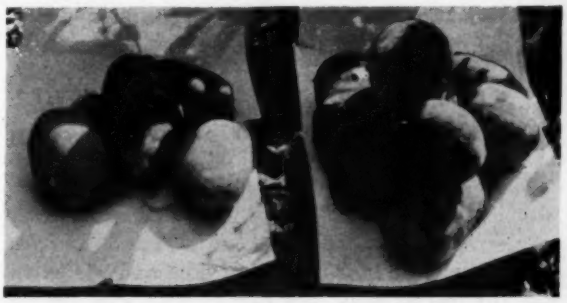
Visualize, if you will, the many trips to the grocery store that would be required to carry 6,000 pounds of potatoes to a war worker's kitchen and the endless hours of K. P. duty that would be needed to peel that many "spuds" for Army mess! That would give you a fair idea of what it would mean to war food production, were every acre of Idaho's potato-growing land to come through with the increased production that Nephi R. Ipsen, supervisor of the Oneida Soil Conservation District, realized from sweetclover land on which he raised potatoes in 1943. On 5 acres Ipsen harvested 5,991 more pounds of potatoes to the acre by turning under sweetclover as a green manure crop than he harvested on the rest of the field, without this treatment.

Though hay, grain and livestock are the main farm products in the Oneida district, pressure for war crops has stimulated potato and sugar beet production on irrigated land. With acreage, available equipment, labor, and irrigation water reaching their limits, the greater food crop production must come through better use of the land and other resources. The primary war-time goal of the soil conservation district is to assist farmers and ranchers to work out their problems through the application of such measures as green manure, and range management.

Assuming that sweetclover were to be used as a needed green manure crop, and that the resultant increase in potato yields would average 30 bags an acre (or only half of the 60-bag increase Supervisor Ipsen obtained), Idaho's 1944 output would be hiked by some 5,400,000 hundred-pound bags. The State's 1944 potato goal is 180,000 acres. Variations in soil types, soil moisture conditions and past rotation or other cropping practices determine, however, how much green manure can be plowed under or whether it is advisable to plant a green manure crop at all. That is where the soil conservation district and the Soil Conservation Service staff assigned to it come in.

Supervisor Ipsen's experience, though outstanding, is one of many vouching for the value of green manure.

"On about April 15, 1942 I planted six pounds of sweetclover seed with 90 pounds of Velvon barley per acre and secured a fair stand of each," Ipsen reported. "During August of 1942 I harvested 13,000 pounds of barley from the whole 6-acre field.



The harvest tells the story. Potatoes at left came from that part of the field on which sweetclover had not been grown; those on right from the part that had been in the green manure crop—each a typical hill. The difference in yield was approximately 6,000 pounds.

"On about May 15, 1943 I mowed the sweetclover which had reached the height of 14 inches, and let the stubble and clover lie on the ground until the clover was quite dry. I then plowed it under to a depth of about 8 inches and proceeded to prepare the land for planting to potatoes. On about May 25 I planted the potatoes, using Russet seed one year removed from certification.

"I noticed that the clover roots began to decay immediately and did not cause any trouble in cultivation. Throughout the season, the ground remained soft and pliable, absorbing the water more readily than that portion of the field where no clover had been planted. The yield and grade of potatoes were very satisfactory. I dug up numerous hills from both patches and compared them. Always the difference in yield was noticeably in favor of the land that had been in sweetclover.

"I am convinced, therefore, that planting sweetclover for a green manure crop is a very profitable conservation practice."

The clover was clipped instead of being plowed under green, because Ipsen, who is secretary of the district board, did not have the help and machinery to turn it under before it would become too coarse to handle. Which method of handling is the better remains to be determined.

Toward the end of the growing season, the potato vines on the sweetclover part of the field were still a healthy green color. But the vines on the rest of the field were brown and apparently dead. The "clincher" came with the harvest. Two random rows of potatoes from each part of the

EDITOR'S NOTE.—The author is work unit leader, Soil Conservation Service, Malad City, Idaho.

field were weighed, and estimates made on the basis of prevailing prices, potatoes sold at $2.25 a hundred for No. 1's, $1.25 for No. 2's and 25¢ for culls. The returns per acre on the Ipsen field were:

	Without sweetclover	*With sweetclover*
Total yield	30,129 pounds	36,120 pounds
Grades: No. 1's	76%	75%
No. 2's	8%	11%
Culls	16%	14%
Cash	$557.37	$671.82

Allowing $1.20 for the clover seed and 75¢ extra cost for the mowing, the extra profit from growing the green manure crop was $112.50 an acre. In terms of war food, that achievement meant an additional 5,991 pounds of potatoes or, roughly, 60 hundred-pound bags on each of the treated acres.

In addition to increasing soil fertility and production of succeeding crops, biennial sweetclover furnishes excellent pasture the first year. The structure of the soil is improved; the water-holding capacity of sandy soil is increased, and the rate of water intake on clay soils is increased. Under irrigation, green manure reduces the time it takes water to soak through the potato bed, and the depth of gravitational water penetration is reduced, resulting in saving of irrigation water. The improved soil structure usually lessens erosion on irrigated fields, and bacteria beneficial to plant growth are encouraged.

Similar increases in potato yields can be obtained by using barnyard manure on most fields, though limited supply and high labor requirements make leguminous green manure crops an additional necessity when a short rotation is being followed. General opinion is that irrigated ground needs 20 tons of barnyard manure an acre to equal the value of such a green manure crop. Some Oneida district farmers have overcome the labor problem to some extent by feeding dry stock right on the fields when the ground is frozen, and others have rigged up mechanical loaders on their tractors to do away with the hand pitching.

With both green manure and barnyard manure, precautions have to be taken in irrigating. When the green manure crop is plowed under, the soil moisture should be controlled; and irrigation water sometimes needs to be added before plowing, because soil that is too dry decreases bacterial action and delays rotting. Soil saturated with water, on the other hand, shuts off the air and reduces oxidation. The soil should be warm when the clover is turned under, to encourage bacterial action. If irrigation water is short the latter part of the growing season, excess manure may cause burning.

Growing green manure crops is but one of the many soil conservation practices that farmers in this soil conservation district are using to improve their land and boost war crop production. The practices include the improvement of irrigation distributing systems, the planting of erodible land to grasses and legumes, the leveling of land, the building of stock ponds, and the using of stubble-mulch tillage.

NATURAL PRINCIPLES OF LAND USE. By Edward H. Graham. Oxford University Press, New York, 1944. 274 pp.

During the last two decades, ecological science and land-use planning have expanded rapidly. Each has become a self-conscious enterprise led by a professional class, and each has claimed to be the necessary foundation for the popular movement known as conservation.

There is obvious logic in these claims. The fly in the ointment is that ecologists know little of land-use, land-planners know little of ecology, and lay conservationists know little of either.

These three enterprises are not, however wholly isolated from each other, for there exist in the forestry, range management, agronomy, and wildlife management professions certain individuals who know something of ecology, of planning, and of conservation. To these has been offered an opportunity of almost terrifying magnitude: to write a book integrating all three into one logical system.

I doubt whether anyone who has not tried it can quite grasp the sweep of such an undertaking. Dr. Graham, in the present volume, has wisely refrained from attempting an exhaustive treatment, i.e. he does not close any circles of documented logic. He attempts, rather, a thumbnail sketch of the certain selected researches, land-use practices, and conservation policies which illustrate *modes of thinking*, good and not so good, pertinent to his title: "Natural Principles of Land Use."

This title, to my way of thinking, is a very happy one. It implies clearly that there are natural and unnatural principles which may be applied to land, and that only those harmonious with the inner merchanisms of the land itself can succeed in the long run. It implies that ecology, and not economics, is the final arbiter of success in land management.

Such a jumping-off point of course raises the question: What is ecology? How does one distinguish a natural principle? The book is an attempt to describe the search for answers to these questions.

My impression is that Dr. Graham is successful to the extent that he deals with specific cases. I find nothing particularly impressive in his first four chapters, which

deal with general concepts, nor in Chapter V on techniques. Chapter VI on land classification strikes me as pedantic, with a strong bureau flavor elsewhere absent. The succeeding chapters on farms, forests, ranges, waters, exotics, and control practices are the heart of the book.

I have seen no better sketch of forest ecology than Dr. Graham presents in Chapter VIII. The materials are so rich and varied that many a major field of inquiry gets only two or three sentences, nevertheless the net effect is coherent and convincing, and the reader is literally given the meat of the author's wide erudition in this field. Nevertheless there are a few distortions of fact. Thus the Kaibab is credited with protecting deer-predators after the 1924 irruption; not only is this not true, but the Kaibab tragedy was allowed to repeat itself on the adjoining deer ranges of Utah without any diminution of predator-control. Again: Dr. Graham repeats the fond fancy that forest plantings can be interlarded between highs of the snowshoe hare cycle. Just what tree can grow out of reach of hares in five years?

The sketch of range ecology is equally effective. It cites the following gem of non-ecological reasoning: "Weeds cause serious reductions in grazing capacity." The shoe, Dr. Graham points out, is on the other foot: Weeds do not *cause* reductions in grazing capacity, they are the *result* of such reductions; the cause is overgrazing. In this simple inversion of cause and effect is told the sad history of forty percent of the area of the United States.

I will not easily forgive the publisher for separating two photographs of this chapter: Plate 22, showing a Navajo village fifty years ago, and Plate 23, showing the same site now occupied by a yawning arroyo. Such rare and valuable "before and after" photographs deserve more respectful handling.

The chapter on pest control says more in twelve pages than many an ecological writer has said in his lifetime. Its philosophy is that of Hinton: "If you create a vacancy, it is your own very difficult business to keep it vacant." Its appraisal of the status quo is illuminating: "we have few universities and no governmental bureau which undertake specific research on numbers of vertebrates," i.e. population problems. (I add my fervent amen.) This quotation, and this chapter, are appropriate examples of how Dr. Graham achieves a very critical appraisal of land-use practices and policies without scolding, without crying over spilt milk, and without apocalyptic prophesies of doom.

The final chapter, "The Land and Human Welfare," is a remarkably concise sketch of the social implications of land conservation. It ends with this prophetic note: "Conservation is more than wise use of natural resources. It may well be the foundation of a new social philosophy. Our [institutions] were developed around exploitation. [Conservation] may well develop a way of life as different from the prevailing one as that is different from the cultures of the past."

Everything taken together, this is a remarkably good book. It is certainly the best, and briefest, of the "conservation series." Barring the first few chapters, it offers the layman a clear picture of conservation, and many a professional biologist who has become cramped into some narrow specialty will do well to read it for reorientation.

ALDO LEOPOLD,
University of Wisconsin

LEELANAU (*continued from page* 36)

couldn't see the need of a referendum. All available educational methods and activity of all the various local leaders were brought to bear on "getting out the vote."

On January 28, 1943, the people voted the district in by a count of 334 to 2. And these people all went to the polls; none were absentee ballots.

The state committee appointed Harold Gilbert, Empire, and Howard Reincke, Sutton Bay, district directors, and farmers elected F. Herrick Waterman, East Leland, Otto Lautner, Elmwood Township, and Frank M. Schaub, Lake Leelanau. The board of directors elected Waterman president and Reincke secretary. They signed a supplemental memorandum of understanding with the Soil Conservation Service on July 5, 1943.

Up to December 31, the district directors had received 50 requests from farmers wanting complete plans and 131 requests for help on single practices as an emergency war production measure. Local leaders estimate that with the help of AAA committeemen, the county agent, and others trained by Soil Conservation Service men, a total of 600 farmers applied starting or production-conservation practices last year. The directors have made no "campaign" for requests, staying just enough ahead to keep Farm Planner Viers and his assistant busy.

And there, for all practical purposes, this story ends. How many of the farmers adopting simple practices will want complete plans, how much of the county will be safely under a soil conservation blanket in a few years, how soil conservation clubs already are being organized in schools and how sets of soil conservation booklets have been placed in every school by the county school commissioner —those things can better wait until another time.

The later story will also include an account of how the district directors are taking hold of the administration of the district, and how 4-H clubs, schools and churches are pushing the program.

RANGE ADJUSTMENTS (*Cont'd from page* 31)

this will partially relieve serious local trailing problems, provide a valuable source of income to land owners, and supply much-needed forage for livestock trailing from winter to summer ranges.

The most important job facing the range livestock industry today is to see that all range areas produce now the maximum amount of beef, mutton, and wool. We cannot afford to lose sight of the kind of management leading to continued high production.

REFERENCE LIST ☆☆

Compiled by William L. Robey, Printing & Distribution Unit

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☆ U. S. GOVERNMENT PRINTING OFFICE: 1944—[illegible]